

What is claimed is:

1. A heating apparatus comprising:

an infrared ray lamp including a heating element which has a substantially plate shape, which is formed of a liner-shaped carbon-based substance of which cross-section is a rectangular shape, and which is hermetically sealed in a glass tube, and

a reflection plate which is disposed so as to keep a predetermined distance from outside of said glass tube of said infrared ray lamp,

wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to an arbitrary portion of said heating element, and is structured such that an object to be heated is disposed in the front position opposing said reflection face of said reflection plate.

2. A heating apparatus in accordance with claim 1 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the wider side portions of said heating element.

3. A heating apparatus in accordance with claim

1 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the narrower side portions of said heating element.

4. A heating apparatus in accordance with any one of claims 1 to 3, wherein said reflection plate provided in said heating apparatus is disposed substantially in parallel with the longitudinal direction of said heating element disposed in front of said reflection plate, and such that the end portions in the longitudinal direction of said heating element are arranged in a substantially straight line with said heating element or said glass tube interposed.

5. A heating apparatus in accordance with any one of claims 1 to 3 wherein a cross-section of said reflection plate has a shape formed of a combination of plural straight lines, such as a part of a polygon.

6. A heating apparatus in accordance with any one of claims 1 to 3 wherein said reflection plate is configured so as to diffuse a radiant heat of said infrared ray lamp to the front.

7. A heating apparatus having an infrared ray lamp which comprises:

at least one heating element having a substantially plate shape or rod shape, having recessed portions in the vicinities of both ends thereof and formed of a carbon-based substance,

heat-emitting blocks having good conductivity to which both end portions of said heating element are inserted and bonded,

a sintered substance of an adhesive formed and sintered on the bonding faces of said heating element bonded to said heat-emitting blocks at the regions in the vicinities of both end portions including the recessed portions of said heating element,

a glass tube in which said heating element, said sintered substance of said adhesive and said heat-emitting blocks are hermetically sealed together with an inert gas, and

lead wires electrically connected to said heat-emitting blocks, the end portions of which are led out of said glass tube.

8. A heating apparatus in accordance with claim 7 wherein said heat-emitting blocks are each divided into two pieces, between which both end portions of said heating element are sandwiched.

9. A drying apparatus comprising:

at least one heating element having a substantially plate shape or rod shape, having recessed portions in the vicinities of both ends thereof and formed of a carbon-based substance,

heat-emitting blocks having good conductivity to which both end portions of said heating element are inserted and bonded,

a sintered substance of an adhesive formed and sintered on the bonding faces of said heating element bonded to said heat-emitting blocks at the regions in the vicinities of both end portions including the recessed portions of said heating element,

a glass tube in which said heating element, said sintered substance of said adhesive and said heat-emitting blocks are hermetically sealed together with an inert gas, and

lead wires electrically connected to said heat-emitting blocks, the end portions of which are led out of said glass tube.

10. A drying apparatus in accordance with claim 9 wherein said heat-emitting blocks are each divided into two pieces, between which both end portions of said heating element are sandwiched.

11. A drying apparatus having an infrared ray

lamp which comprises:

a heating element having a substantially plate shape, the width of which is larger than its thickness by five times or more,

a glass tube in which said heating element is hermetically sealed,

an electrode embedded at both end portions of said glass tube, electrically connected to both ends of said heating element respectively and also electrically connected to an external electric circuit,

a connection device secured to both end portions of said heating element respectively and electrically connected to said heating element, and

lead wires secured to said connection devices and said electrodes so as to pull both ends of said heating element at a predetermined tension and used to electrically connect said connection devices to said electrodes,

wherein said connection device has a heat-emitting block, the cross-sectional area of which is larger than the cross-sectional area of said heating element on a plane perpendicular to the direction of the current flowing through said heating element, in order to prevent said lead wires from being overheated by emitting heat transmitted from said heating element.

12. A drying apparatus comprising:

an infrared ray lamp including a heating element which has a substantially plate shape, which is formed of a linear-shaped carbon-based substance of which cross-section is a rectangular shape, and which is hermetically sealed in a glass tube, and

a reflection plate which is disposed so as to keep a predetermined distance from outside of said glass tube of said infrared ray lamp,

wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to an arbitrary portion of said heating element, and is structured such that an object to be heated is disposed in the front position opposing said reflection face of said reflection plate.

13. A drying apparatus in accordance with claim 12 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the wider side portions of said heating element.

14. A drying apparatus in accordance with claim 12 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the narrower side portions of said heating element.

15. A cooking apparatus comprising:

at least one heating element having a substantially plate shape or rod shape, having recessed portions in the vicinities of both ends thereof and formed of a carbon-based substance,

heat-emitting blocks having good conductivity to which both end portions of said heating element are inserted and bonded,

a sintered substance of an adhesive formed and sintered on the bonding faces of said heating element bonded to said heat-emitting blocks at the regions in the vicinities of both end portions including the recessed portions of said heating element,

a glass tube in which said heating element, said sintered substance of said adhesive and said heat-emitting blocks are hermetically sealed together with an inert gas, and

lead wires electrically connected to said heat-emitting blocks, the end portions of which are led out of said glass tube.

16. A cooking apparatus in accordance with claim 15 wherein said heat-emitting blocks are each divided into two pieces, between which both end portions of said heating element are sandwiched.

17. A cooking apparatus having an infrared ray

lamp which comprises:

a heating element having a substantially plate shape, the width of which is larger than its thickness by five times or more,

a glass tube in which said heating element is hermetically sealed,

an electrode embedded at both end portions of said glass tube, electrically connected to both ends of said heating element respectively and also electrically connected to an external electric circuit,

a connection device secured to both end portions of said heating element respectively and electrically connected to said heating element, and

lead wires secured to said connection devices and said electrodes so as to pull both ends of said heating element at a predetermined tension and used to electrically connect said connection devices to said electrodes,

wherein said connection device has a heat-emitting block, the cross-sectional area of which is larger than the cross-sectional area of said heating element on a plane perpendicular to the direction of the current flowing through said heating element, in order to prevent said lead wires from being overheated by emitting heat transmitted from said heating element.

18. A cooking apparatus comprising:



an infrared ray lamp including a heating element which has a substantially plate shape, which is formed of a linear-shaped carbon-based substance of which cross-section is a rectangular shape, and which is hermetically sealed in a glass tube, and

a reflection plate which is disposed so as to keep a predetermined distance from outside of said glass tube of said infrared ray lamp,

wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to an arbitrary portion of said heating element, and is structured such that an object to be heated is disposed in the front position opposing said reflection face of said reflection plate.

19. A cooking apparatus in accordance with claim 18 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the wider side portions of said heating element.

20. A cooking apparatus in accordance with claim 18 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the narrower side portions of said heating element.

21. A copier comprising:

at least one heating element having a substantially plate shape or rod shape, having recessed portions in the vicinities of both ends thereof and formed of a carbon-based substance,

heat-emitting blocks having good conductivity to which both end portions of said heating element are inserted and bonded,

a sintered substance of an adhesive formed and sintered on the bonding faces of said heating element bonded to said heat-emitting blocks at the regions in the vicinities of both end portions including the recessed portions of said heating element,

a glass tube in which said heating element, said sintered substance of said adhesive and said heat-emitting blocks are hermetically sealed together with an inert gas, and

lead wires electrically connected to said heat-emitting blocks, the end portions of which are led out of said glass tube.

22. A copier in accordance with claim 21 wherein said heat-emitting blocks are divided into two pieces, between which both end portions of said heating element are sandwiched.

23. A copier having an infrared ray lamp which

comprises:

a heating element having a substantially plate shape, the width of which is larger than its thickness by five times or more,

a glass tube in which said heating element is hermetically sealed,

an electrode embedded at both end portions of said glass tube, electrically connected to both ends of said heating element respectively and also electrically connected to an external electric circuit,

a connection device secured to both end portions of said heating element respectively and electrically connected to said heating element, and

lead wires secured to said connection devices and said electrodes so as to pull both ends of said heating element at a predetermined tension and used to electrically connect said connection devices to said electrodes,

wherein said connection device has a heat-emitting block, the cross-sectional area of which is larger than the cross-sectional area of said heating element on a plane perpendicular to the direction of the current flowing through said heating element, in order to prevent said lead wires from being overheated by emitting heat transmitted from said heating element.

24. A copier comprising:

an infrared ray lamp including a heating element which has a substantially plate shape, which is formed of a linear-shaped carbon-based substance of which cross-section is a rectangular shape, and which is hermetically sealed in a glass tube, and

a reflection plate which is disposed so as to keep a predetermined distance from outside of said glass tube of said infrared ray lamp,

wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to an arbitrary portion of said heating element, and is structured such that an object to be heated is disposed in the front position opposing said reflection face of said reflection plate.

25. A copier in accordance with claim 24 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the wider side portions of said heating element.

26. A copier in accordance with claim 24 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the narrower side portions of said heating element.

27. A printer comprising:

at least one heating element having a substantially plate shape or rod shape, having recessed portions in the vicinities of both ends thereof and formed of a carbon-based substance,

heat-emitting blocks having good conductivity to which both end portions of said heating element are inserted and bonded,

a sintered substance of an adhesive formed and sintered on the bonding faces of said heating element bonded to said heat-emitting blocks at the regions in the vicinities of both end portions including the recessed portions of said heating element,

a glass tube in which said heating element, said sintered substance of said adhesive and said heat-emitting blocks are hermetically sealed together with an inert gas, and

lead wires electrically connected to said heat-emitting blocks, the end portions of which are led out of said glass tube.

28. A printer in accordance with claim 27 wherein said heat-emitting blocks are each divided into two pieces, between which both end portions of said heating element are sandwiched.

29. A printer having an infrared ray lamp which

comprises:

a heating element having a substantially plate shape, the width of which is larger than its thickness by five times or more,

a glass tube in which said heating element is hermetically sealed,

an electrode embedded at both end portions of said glass tube, electrically connected to both ends of said heating element respectively and also electrically connected to an external electric circuit,

a connection device secured to both end portions of said heating element respectively and electrically connected to said heating element, and

lead wires secured to said connection devices and said electrodes so as to pull both ends of said heating element at a predetermined tension and used to electrically connect said connection devices to said electrodes,

wherein said connection device has a heat-emitting block, the cross-sectional area of which is larger than the cross-sectional area of said heating element on a plane perpendicular to the direction of the current flowing through said heating element, in order to prevent said lead wires from being overheated by emitting heat transmitted from said heating element.

30. A printer comprising:

an infrared ray lamp including a heating element which has a substantially plate shape, which is formed of a linear-shaped carbon-based substance of which cross-section is a rectangular shape, and which is hermetically sealed in a glass tube, and

a reflection plate which is disposed so as to keep a predetermined distance from outside of said glass tube of said infrared ray lamp,

wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to an arbitrary portion of said heating element, and is structured such that an object to be heated is disposed in the front position opposing said reflection face of said reflection plate.

31. A printer in accordance with claim 30 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the wider side portions of said heating element.

32. A printer in accordance with claim 30 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the narrower side portions of said heating element.

33. An industrial coating drier comprising:

at least one heating element having a substantially plate shape or rod shape, having recessed portions in the vicinities of both ends thereof and formed of a carbon-based substance,

heat-emitting blocks having good conductivity to which both end portions of said heating element are inserted and bonded,

a sintered substance of an adhesive formed and sintered on the bonding faces of said heating element bonded to said heat-emitting blocks at the regions in the vicinities of both end portions including the recessed portions of said heating element,

a glass tube in which said heating element, said sintered substance of said adhesive and said heat-emitting blocks are hermetically sealed together with an inert gas, and

lead wires electrically connected to said heat-emitting blocks, the end portions of which are led out of said glass tube.

34. An industrial coating drier in accordance with claim 33 wherein said heat-emitting blocks are each divided into two pieces, between which both end portions of said heating element are sandwiched.

35. An industrial coating drier having an



infrared ray lamp which comprises:

a heating element having a substantially plate shape, the width of which is larger than its thickness by five times or more,

a glass tube in which said heating element is hermetically sealed,

an electrode embedded at both end portions of said glass tube, electrically connected to both ends of said heating element respectively and also electrically connected to an external electric circuit,

a connection device secured to both end portions of said heating element respectively and electrically connected to said heating element, and

lead wires secured to said connection devices and said electrodes so as to pull both ends of said heating element at a predetermined tension and used to electrically connect said connection devices to said electrodes,

wherein said connection device has a heat-emitting block, the cross-sectional area of which is larger than the cross-sectional area of said heating element on a plane perpendicular to the direction of the current flowing through said heating element, in order to prevent said lead wires from being overheated by emitting heat transmitted from said heating element.

36. An industrial coating drier comprising:

an infrared ray lamp including a heating element which has a substantially plate shape, which is formed of a linear-shaped carbon-based substance of which cross-section is a rectangular shape, and which is hermetically sealed in a glass tube, and

a reflection plate which is disposed so as to keep a predetermined distance from outside of said glass tube of said infrared ray lamp,

wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to an arbitrary portion of said heating element, and is structured such that an object to be heated is disposed in the front position opposing said reflection face of said reflection plate.

37. An industrial coating drier in accordance with claim 36 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the wider side portions of said heating element.

38. An industrial coating drier in accordance with claim 36 wherein said reflection plate is disposed so that an inner reflection face of said reflection plate is opposed to one of the narrower side portions of said heating element.